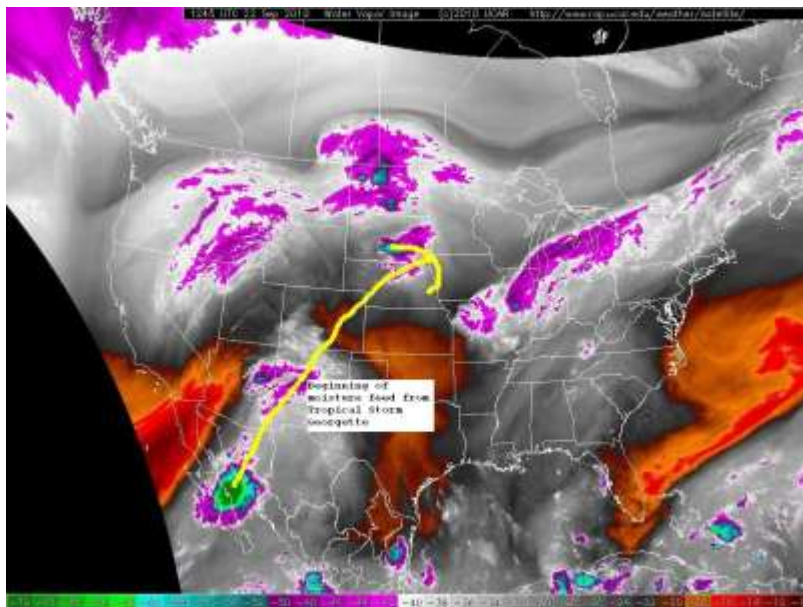


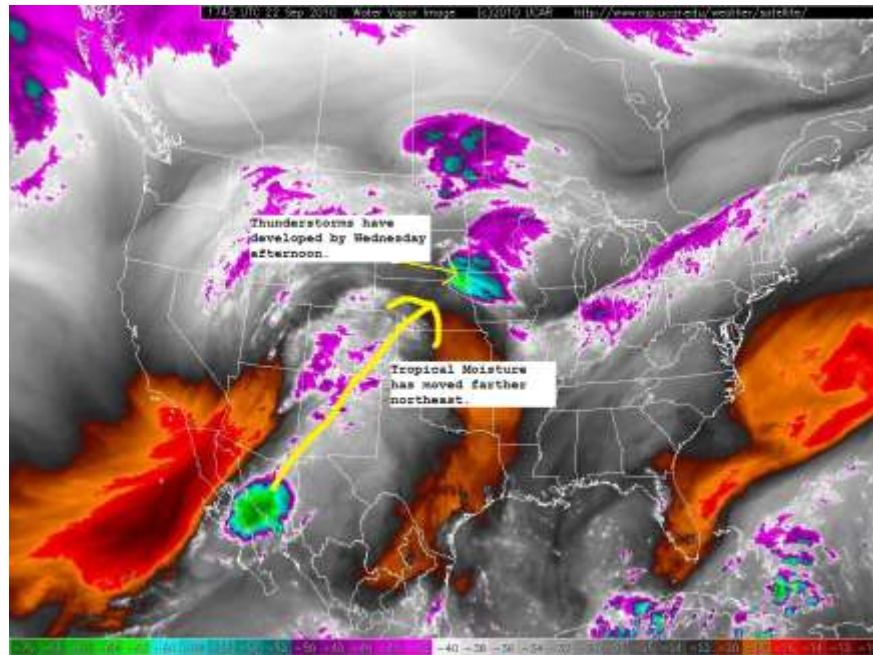
September 22-23, 2010: Significant Rainfall and Widespread Flooding Across Southern Minnesota and Wisconsin

Synopsis

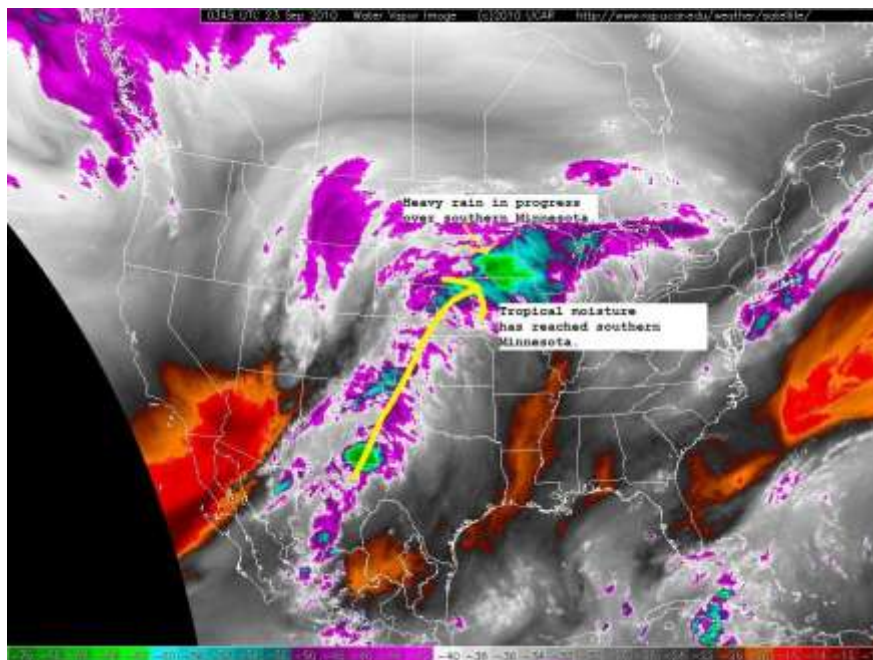
While later September is thought to be a drier and more of a storm-free time in the Upper Midwest, September 22-23, 2010 presented exactly the opposite. A classic setup for heavy rain evolved over the area, helped in large part by deep tropical-origin moisture from former tropical cyclones. Moisture from both the remnants of tropical storm Georgette in the eastern Pacific Ocean and Hurricane Karl in the Gulf of Mexico appeared to be ushered northward into the region during this heavy rain episode. Such deep tropical influence is known to enhance rainfall rates and was the case over the area. Satellite imagery of atmospheric water vapor shows this trend (shown below). The weather balloon launch from our NWS office on the evening of September 23rd observed a precipitable water of 2.01 inches (shown on the right). This was one of the highest precipitable waters on record for September or later in the year in Minnesota.



Water Vapor Satellite Loop - 8 am Wednesday morning



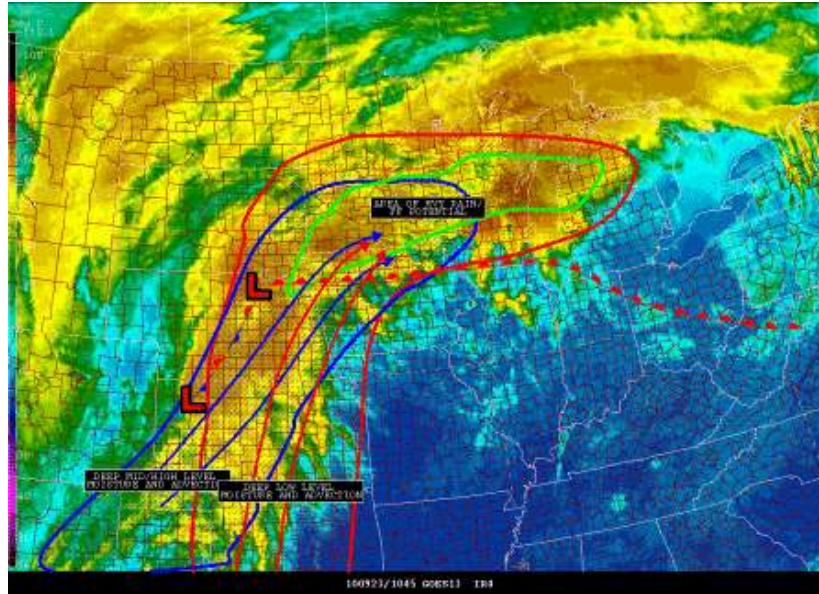
Water Vapor Satellite Loop - 1 pm Wednesday afternoon



Water Vapor Satellite Loop - 11 pm Wednesday evening

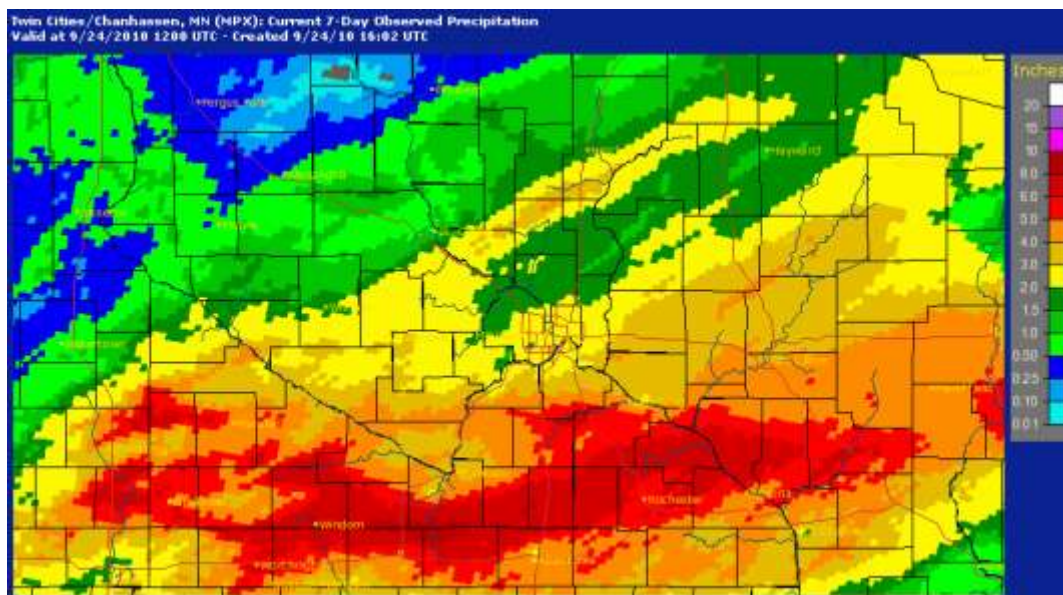
This moisture, along with instability, was brought northward by developing low pressure in the central Plains. The first low pressure on the afternoon and night of the 22nd developed in Kansas and moved into northwest Iowa, uplifting the first surge of moist and unstable air across the area. Thunderstorms, a few severe ones, developed in response on that evening. Eventually as the night progressed, widespread heavy-rain producing storms evolved and trained from west to east over southern Minnesota, in an axis north of the surface warm front. This is a favorable corridor for heavy rain that meteorologists look for. A second low pressure

lifted northward into Minnesota on the 23rd, providing an even more tropical moisture surge. Much of this rain was lightning free, but was still very heavy in rate. Many communities in southern Minnesota saw no respite from when the rain started on the afternoon of the 22nd into the afternoon of the 23rd.



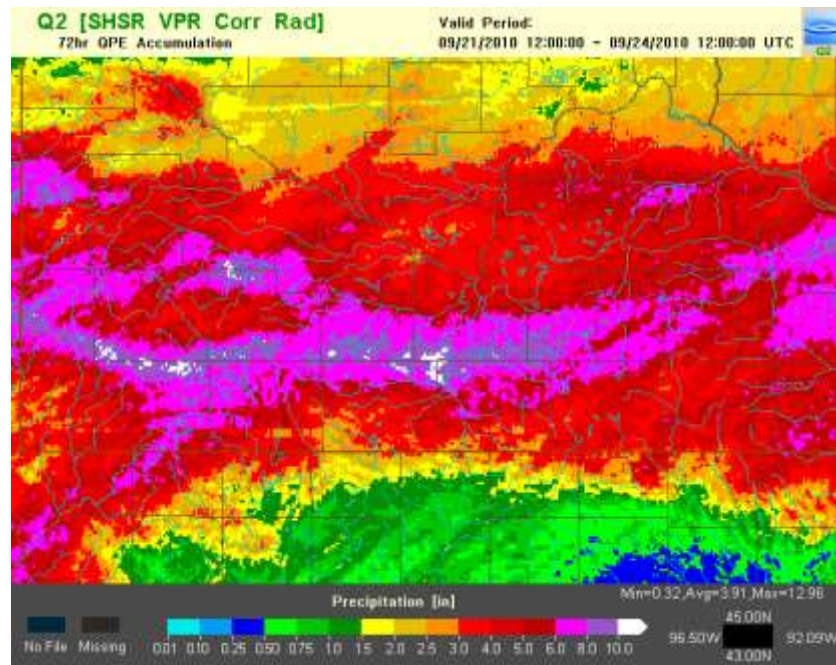
Ideal weather setup for heavy rain and flooding - Courtesy of NWS/NESDIS issued at 6 am on the morning of September 23rd

Rainfall Amounts

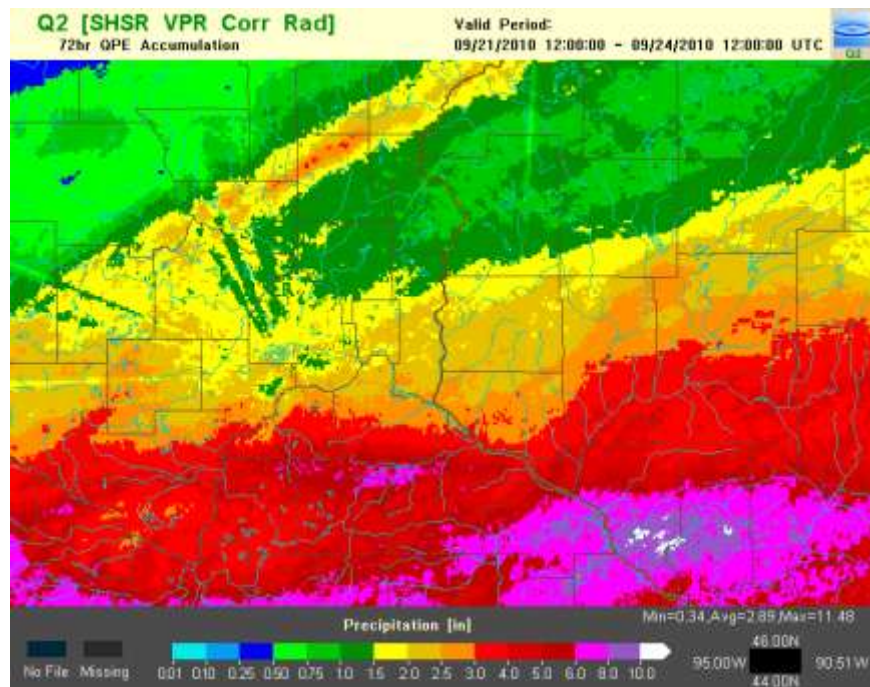


Multi-sensor Estimated 7-day Precipitation Total Ending at 7 AM CDT Friday, September 25, 2010

High-resolution Multi-Sensor Rainfall Estimates



Southern Minnesota



Western Wisconsin

Event Rainfall Totals From 7 am September 22 through 7 am September 24th

THE FOLLOWING TABLE SHOWS 48 HOUR RAINFALL AMOUNTS FROM 7 AM SEPTEMBER 22ND TO 7AM SEPTEMBER 24TH. THE OBSERVATIONS IN THIS TABLE ARE OFFICIAL.

LOCATION	48 HOUR RAINFALL AMOUNT
AMBOY MN	10.68 INCHES
WINNEBAGO MN	7.98 INCHES
OWATONNA MN	7.91 INCHES
ZUMBROTA MN	7.66 INCHES
WASECA MN	7.65 INCHES
BLUE EARTH MN	6.73 INCHES
MONTGOMERY MN	5.64 INCHES
FARIBAULT MN	5.56 INCHES
SPRINGFIELD MN	5.47 INCHES
DURAND WI	5.44 INCHES
FAIRMONT MN	5.42 INCHES
ALBERT LEA MN	5.18 INCHES
HENDERSON MN	5.18 INCHES
MANKATO MN	5.18 INCHES
GOODHUE MN	5.10 INCHES
MORGAN MN	5.00 INCHES
RED WING MN	4.56 INCHES
REDWOOD FALLS MN	4.17 INCHES
BROWNTON MN	3.93 INCHES
FARMINGTON MN CWSU	3.92 INCHES
GAYLORD MN	3.89 INCHES
CHIPPEWA FALLS WI	3.87 INCHES
JORDAN MN	3.84 INCHES
HUTCHINSON MN	3.83 INCHES
REDWOOD FALLS MN ASOS	3.64 INCHES
EAU CLAIRE WI ASOS	3.61 INCHES
SPRING VALLEY WI	3.58 INCHES
BALDWIN WI	3.52 INCHES
SHELDON WI	3.52 INCHES
STANLEY WI	3.43 INCHES
MENOMONIE WI	3.41 INCHES
HOLCOMBE WI	3.38 INCHES
LADYSMITH WI	3.31 INCHES
JIM FALLS WI	3.29 INCHES
HAMMOND WI	3.25 INCHES
LWR ST. ANTHONY MN	3.18 INCHES
ROBERTS WI	3.14 INCHES
BLOOMER WI	3.09 INCHES
HASTINGS MN	3.08 INCHES
CEDAR FALLS WI	3.07 INCHES
MINNEAPOLIS MN ASOS	2.99 INCHES
CHANHASSEN MN NWS	2.95 INCHES
CHANHASSEN MN	2.91 INCHES
CHASKA MN	2.84 INCHES
STILLWATER WTP MN	2.75 INCHES
HAMBURG MN	2.74 INCHES
MONTEVIDEO MN	2.72 INCHES
ST. PAUL MN ASOS	2.71 INCHES

STILLWATER MN	2.70 INCHES
RICE LAKE WI	2.69 INCHES
VICTORIA MN	2.67 INCHES
ROCKFORD MN	2.66 INCHES
KIMBALL MN	2.63 INCHES
ST. PAUL U OF MMN	2.57 INCHES
LESTER PRAIRIE MN	2.56 INCHES
CUMBERLAND WI	2.53 INCHES
LITCHFIELD MN	2.50 INCHES
ELK MOUND WI	2.48 INCHES
FLYING CLOUD MN	2.46 INCHES
CARVER MN	2.44 INCHES
WACONIA MN	2.44 INCHES
ANDOVER MN	2.43 INCHES
BUFFALO MN	2.42 INCHES
SPRING PARK MN	2.34 INCHES
FRIDLEY MN	2.21 INCHES
CRYSTAL MN ASOS	2.08 INCHES
WILD RVR ST PARK MN	1.97 INCHES
FOREST LAKE MN	1.91 INCHES
MILACA MN	1.58 INCHES
MORA MN	1.56 INCHES
ST. CLOUD MN ASOS	1.53 INCHES
WILLMAR MN	1.46 INCHES
MADISON MN	1.31 INCHES
MELROSE MN	1.02 INCHES
ONAMIA MN	0.99 INCHES
RICE MN	0.96 INCHES
LONG PRAIRIE MN	0.62 INCHES
ALEXANDRIA MN ASOS	0.54 INCHES

THE FOLLOWING TABLE SHOWS 48 HOUR RAINFALL AMOUNTS FROM 7 AM
SEPTEMBER 22ND TO 7AM SEPTEMBER 24TH. THE OBSERVATIONS BELOW
ARE FROM THE COCORAHS OBSERVING NETWORK.

LOCATION	48 HOUR RAINFALL AMOUNT
MAPLETON MN 4N	8.82 INCHES
OWATONNA MN 4W	7.92 INCHES
OWATONNA MN 1E	7.75 INCHES
NORTHFIELD MN 1SE	6.79 INCHES
LONSDALE MN 1SSW	5.70 INCHES
MONTGOMERY MN 3ENE	5.70 INCHES
MONTGOMERY MN 3E	5.52 INCHES
PERTH MN 3NW	5.50 INCHES
SPRINGFIELD MN 2NNW	5.37 INCHES
HENDERSON MN 1 SE	5.20 INCHES
LAKEVILLE MN 7SSW	5.00 INCHES
WARSAW MN 4SE	4.78 INCHES
MARNA MN 2NNW	4.67 INCHES
HAMPTON MN 1S	4.66 INCHES
MANKATO MN	4.51 INCHES
BRICELYN MN	4.42 INCHES
NEW ROME MN 3W	4.42 INCHES
ARKANSAW WI 4NW	4.25 INCHES

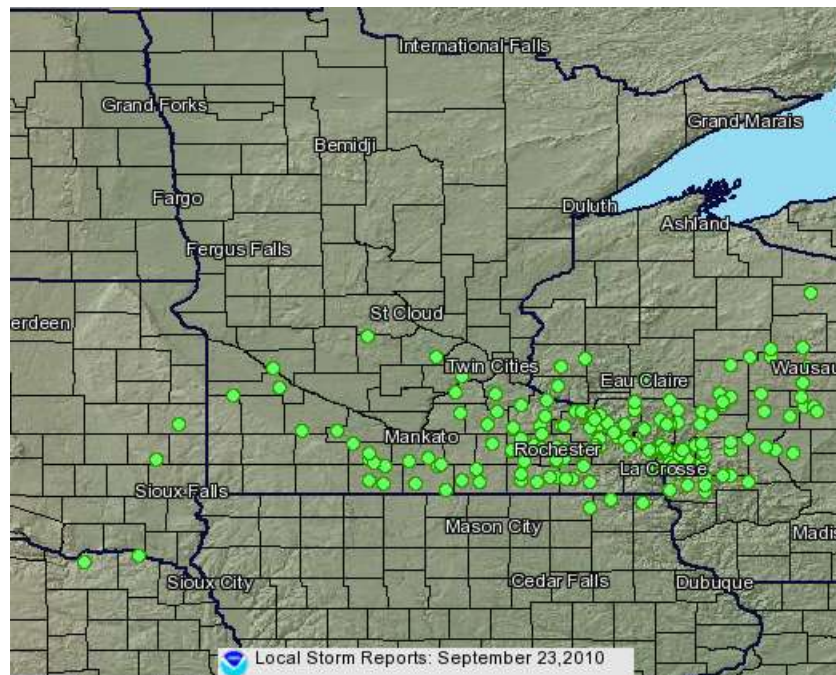
NEW ULM MN 3ESE	4.04 INCHES
EAU CLAIRE WI 3W	3.90 INCHES
PRIOR LAKE MN 2ESE	3.83 INCHES
PRIOR LAKE MN 2W	3.68 INCHES
DANUBE MN	3.63 INCHES
CARNELIAN JUNCTION MN	3.58 INCHES
RIVER FALLS WI 3SE	3.49 INCHES
DOWNING 4NNE	3.32 INCHES
ROSEMOUNT MN 3WNW	3.26 INCHES
BIRD ISLAND MN 9NNE	3.25 INCHES
CHETEK WI 2SE	3.21 INCHES
CARVER MN 1W	3.08 INCHES
EAGAN MN 3SW	3.08 INCHES
LADYSMITH WI 3WNW	3.07 INCHES
INVER GROVE HEIGHTS MN 1ENE	3.05 INCHES
WOODBURY MN 1NNE	3.05 INCHES
BECKER MN 2N	3.02 INCHES
SIEGEL MN 2NW	2.98 INCHES
BURNSVILLE MN 3NE	2.97 INCHES
EAGAN MN 2W	2.81 INCHES
ST. PAUL MN 3WNW	2.79 INCHES
WOODBURY MN 4NE	2.78 INCHES
LAKE ELMO MN 3SE	2.76 INCHES
SAINT FRANCIS MN 4E	2.73 INCHES
EDINA MN 1SW	2.71 INCHES
STILLWATER MN	2.71 INCHES
GLOSTER MN 1NNW	2.64 INCHES
MPLS MN TARGET FIELD	2.60 INCHES
MONTEVIDEO MN	2.55 INCHES
HAMEL MN 1NW	2.46 INCHES
DELANO MN 1SSW	2.45 INCHES
CRYSTAL MN	2.42 INCHES
ST. MICHAEL MN 1ENE	2.36 INCHES
N ST. PAUL MN 1NNW	2.31 INCHES
BROOKLYN CENTER MN	2.27 INCHES
COON RAPIDS MN 2NNW	2.22 INCHES
ISANTI MN 1NW	2.14 INCHES
COON RAPIDS MN 6N	2.04 INCHES
BALD EAGLE MN 1SE	2.02 INCHES
BONNIE GLEN MN 1S	1.91 INCHES
MARINE ST. CROIX MN 4NW	1.83 INCHES
WYOMING MN 1SSW	1.46 INCHES
ST. CLOUD MN 5W	1.09 INCHES
RICE MN 2WSW	1.05 INCHES
COLD SPRING MN 1NNW	1.00 INCHES
RICE MN 3 WNW	1.00 INCHES
WOODLAND MN 1W	0.97 INCHES

THE FOLLOWING TABLE SHOWS 48 HOUR RAINFALL AMOUNTS FROM 7 AM
 SEPTEMBER 22ND TO 7AM SEPTEMBER 24TH. THE OBSERVATIONS BELOW
 ARE FROM TRAINED SPOTTERS.

LOCATION	48 HOUR RAINFALL AMOUNT

ST. JAMES MN	11.75 INCHES
MINNESOTA LAKE MN 1ENE	9.83 INCHES
SOUTH BRANCH MN 1SW	9.82 INCHES
WANAMINGO MN	7.30 INCHES
DIABLO MN 3ESE	4.00 INCHES
PRIOR LAKE MN	3.82 INCHES
MENOMONIE WI	3.50 INCHES
MINNEAPOLIS MN 5ESE	3.40 INCHES
MONTROSE MN 3E	3.20 INCHES
MINNETONKA MN	2.87 INCHES

Flooding Reports



Locations of Flooding Reports Received by the National Weather Service

Text reports of flooding and hail follow...

PRELIMINARY LOCAL STORM REPORT...SUMMARY
 NATIONAL WEATHER SERVICE TWIN CITIES/CHANHASSEN MN
 515 AM CDT MON SEP 27 2010

..TIME...	...EVENT...	...CITY LOCATION...	...LAT.LON...
..DATE...MAG....	..COUNTY LOCATION..ST..	...SOURCE....
	..REMARKS..		
0710 PM	HAIL	BUTTERFIELD	43.96N 94.79W
09/22/2010	M1.25 INCH	WATONWAN MN	TRAINED SPOTTER
	RANGED FROM PEA TO HALF DOLLAR		
0710 PM	HAIL	4 SW BUTTERFIELD	43.92N 94.85W
09/22/2010	M1.25 INCH	WATONWAN MN	TRAINED SPOTTER

0745 PM	HAIL	1 SW SOUTH BRANCH	43.87N 94.57W
09/22/2010	M1.00 INCH	WATONWAN MN	TRAINED SPOTTER
0750 PM	HAIL	2 SSE SOUTH BRANCH	43.85N 94.54W
09/22/2010	M1.00 INCH	WATONWAN MN	TRAINED SPOTTER
0754 PM	HAIL	1 W TRUMAN	43.83N 94.46W
09/22/2010	M1.50 INCH	MARTIN MN	LAW ENFORCEMENT
0803 PM	HAIL	NW NORTHROP	43.74N 94.44W
09/22/2010	M1.00 INCH	MARTIN MN	TRAINED SPOTTER
0825 PM	HAIL	WINNEBAGO	43.77N 94.17W
09/22/2010	M1.00 INCH	FARIBAULT MN	TRAINED SPOTTER
0935 PM	FLOOD	LAKE CRYSTAL	44.10N 94.22W
09/22/2010		BLUE EARTH MN	LAW ENFORCEMENT

ROAD CLOSED IN LAKE CRYSTAL DUE TO HIGH WATER IN EXCESS
OF A FOOT. 3-4 INCHES OF WATER COVERING ROADS IN RAPIDAN.

1030 PM	FLOOD	PORTER	44.64N 96.17W
09/22/2010		YELLOW MEDICINE MN	LAW ENFORCEMENT

WATER OVER ROAD AT HWY 68

1210 AM	FLOOD	FAIRMONT	43.64N 94.46W
09/23/2010		MARTIN MN	COUNTY OFFICIAL

CURB FLOODING REPORTED IN TOWN

0229 AM	FLOOD	MINNESOTA LAKE	43.84N 93.83W
09/23/2010		FARIBAULT MN	TRAINED SPOTTER

7.38 INCHES OF RAIN. LIFT STATION FLOODING WITH REPORTS
OF BASEMENTS FILLING WITH WATER.

0300 AM	FLOOD	4 E WALNUT GROVE	44.23N 95.39W
09/23/2010		REDWOOD MN	LAW ENFORCEMENT

WATER OVER ROAD AT COUNTY RD 7 SOUTH OF US HWY 14

0300 AM	FLOOD	2 E WALNUT GROVE	44.23N 95.43W
09/23/2010		REDWOOD MN	LAW ENFORCEMENT

WATER OVER ROAD AT HWY 10 SOUTH OF US HWY 14

0400 AM	FLASH FLOOD	OWATONNA	44.09N 93.22W
09/23/2010		STEELE MN	EMERGENCY MNGR

STREET FLOODING IN OWATONNA. INTERSECTIONS CLOSED. HOMES
EVACUATED ALONG MAPLE CREEK. SANDBAGGING ALONG THE
STRAIGHT RIVER WHICH IS OUT OF ITS BANKS.

0545 AM	FLASH FLOOD	ZUMBROTA	44.29N 92.67W
---------	-------------	----------	---------------

09/23/2010

GOODHUE

MN DEPT OF HIGHWAYS

HIGHWAY 52 CLOSED FROM NEAR ZUMBROTA TO PINE ISLAND DUE TO WATER OVER THE ROADS /RUNOFF FROM FARM FIELDS/. NUMEROUS ROAD CLOSURES IN ZUMBROTA COUNTY INCLUDING HIGHWAY 60 NEAR BOMBAY AND HIGHWAY 56 NEAR WEST CONCORD DUE TO OVERFLOWING CREEKS.

0715 AM FLASH FLOOD 1 ENE MINNESOTA LAKE 43.85N 93.81W
09/23/2010 FARIBAULT MN TRAINED SPOTTER

8.35 INCHES OF RAIN WITH PONDING AND STANDING WATER AND LOCAL STREAMS RISING QUICKLY.

0800 AM FLASH FLOOD TRUMAN 43.83N 94.44W
09/23/2010 MARTIN MN EMERGENCY MNGR

ROADS FLOODED IN TRUMAN. FOUR TO FIVE FEET OF WATER IN BASEMENTS. EGRESS WINDOWS BROKEN DUE TO FLOODING.

0940 AM FLOOD ST JAMES 43.98N 94.63W
09/23/2010 WATONWAN MN TRAINED SPOTTER

NUMEROUS STREETS UNDERWATER WITH SOME CLOSED. A FEW APARTMENTS HAVE BEEN EVACUATED DUE TO WATER.

0418 PM FLASH FLOOD KENYON 44.27N 92.99W
09/23/2010 GOODHUE MN LAW ENFORCEMENT

HIGHWAY 60 WEST OF KENYON IS CLOSED.

0418 PM FLASH FLOOD PINE ISLAND 44.20N 92.65W
09/23/2010 GOODHUE MN LAW ENFORCEMENT

COUNTY ROAD 3 IS UNDER WATER. GROCERY STORES IN TOWN SHUT DOWN.

0418 PM FLASH FLOOD ZUMBROTA 44.29N 92.67W
09/23/2010 GOODHUE MN LAW ENFORCEMENT

HIGHWAY 58 CLOSED. MULTIPLE COUNTY ROADS ARE CLOSED TOO.

0515 PM FLOOD PORTER 44.64N 96.17W
09/23/2010 YELLOW MEDICINE MN EMERGENCY MNGR

LEVEE OVERTOPPED AND ERODING ON THE YELLOW MEDICINE RIVER. COMMUNITIY IS SANDBAGGING AS HOUSES AND SOME BUSINESS ARE BEING THREATENED.

0730 PM FLASH FLOOD ELLSWORTH 44.74N 92.48W
09/23/2010 PIERCE WI LAW ENFORCEMENT

HALF DOZEN ROADS UNDERWATER IN PIERCE COUNTY.

0758 PM FLOOD FARIBAULT 44.30N 93.27W
09/23/2010 RICE MN EMERGENCY MNGR

2ND AVENUE IN FARIBAULT FLOODED. NUMEROUS BASEMENTS IN
FARIBAULT ALSO FLOODED.

0758 PM	FLOOD	4 E HARTLAND	43.80N 93.41W
09/23/2010		FREEBORN	MN LAW ENFORCEMENT

A SECTION OF 340TH STREET BETWEEN COUNTY RD 20 AND COUNTY
RD 24 CLOSED DUE TO FLOODING. ROAD CLOSED SINCE 230 PM.

0358 AM	FLOOD	OWATONNA	44.09N 93.22W
09/24/2010		STEELE	MN EMERGENCY MNGR

NORTH/SOUTH BRIDGES IN TOWN ARE CLOSED AND THE LAST OF
THE EAST/WEST BRIDGES IN TOWN COULD BE CLOSED SHORTLY. MN
DOT IS EVALUATING CLOSING INTERSTATE 35W SOUTH OF TOWN IN
BOTH DIRECTIONS WITH WATER OVER ROAD.

0530 AM	FLOOD	S OWATONNA	44.09N 93.22W
09/24/2010		STEELE	MN EMERGENCY MNGR

NORTH AND SOUTH BOUND LANES OF INTERSTATE 35 HAVE BEEN
CLOSED SOUTH OF OWATONNA DUE TO WATER OVER THE ROADWAY.

1236 PM	FLOOD	LAMBERTON	44.23N 95.26W
09/24/2010		REDWOOD	MN PARK/FOREST SRVC

MINNESOTA DNR WATER CREWS MEASURED 1900 CFS OVER A ROAD.
THE DEPTH OF THE WATER WAS 0.6 FEET AND THE LENGTH OF THE
AFFECTED AREA WAS ABOUT 3000 FEET.

0226 PM	FLOOD	FARIBAULT	44.30N 93.27W
09/24/2010		RICE	MN EMERGENCY MNGR

CANNON RIVER FLOODED OVER 2ND AVE NW. FLOODING UP TO AND
INTO 1ST AVENUE NW. WATER TREATMENT PLANT IS FLOODED.

0417 PM	FLOOD	SPRINGFIELD	44.24N 94.98W
09/24/2010		BROWN	MN EMERGENCY MNGR

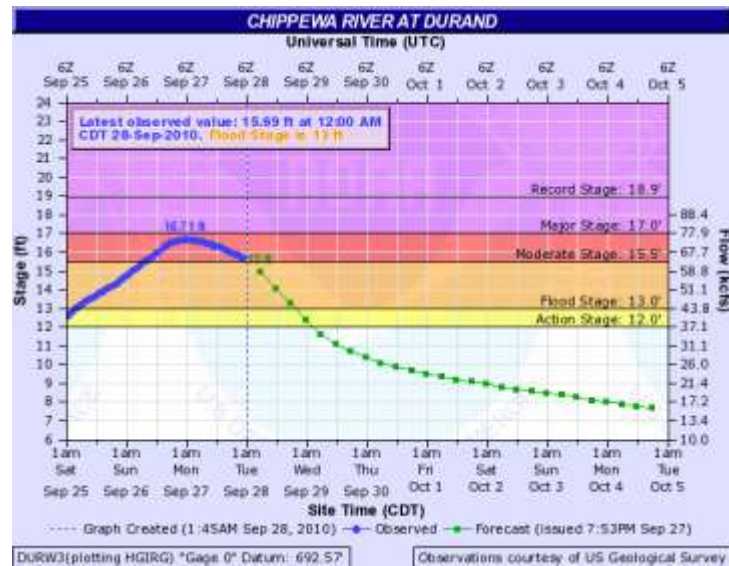
POTENTIAL DYKE FAILURE ON THE COTTONWOOD RIVER NEAR
EASTERN SPRINGFIELD. WATER SEEPAGE OBSERVED ON THE BOTTOM
OF THE DYKE.

0740 PM	FLOOD	SPRINGFIELD	44.24N 94.98W
09/25/2010		BROWN	MN TRAINED SPOTTER

ONE QUARTER MILE OF RAILROAD TRACKS UNDER WATER JUST WEST
OF TOWN.

River Crests

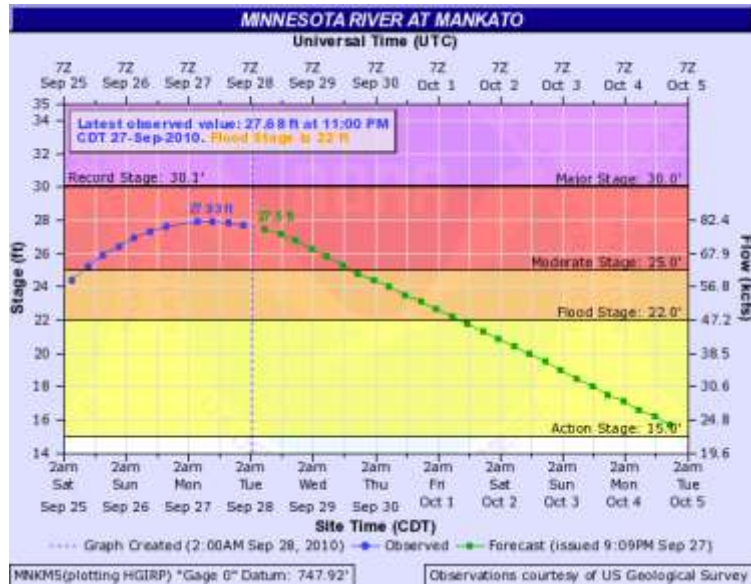
In response to the heavy rain, area rivers rose from September 23rd and for several days after. Henderson on the Minnesota River reached record flood stage, surpassing the 1965 flood at that point. Other notable crests include the 3rd highest at New Ulm on the Cottonwood River and the 4th highest at Mankato on the Minnesota River. The high water volume on area rivers forced the closing of several key roadways, including in the southwest Twin Cities metro area. Many of the crests observed along the Minnesota River from New Ulm downstream and other southern Minnesota streams were in the top three highest, and in some cases the highest, ever to be observed in autumn.



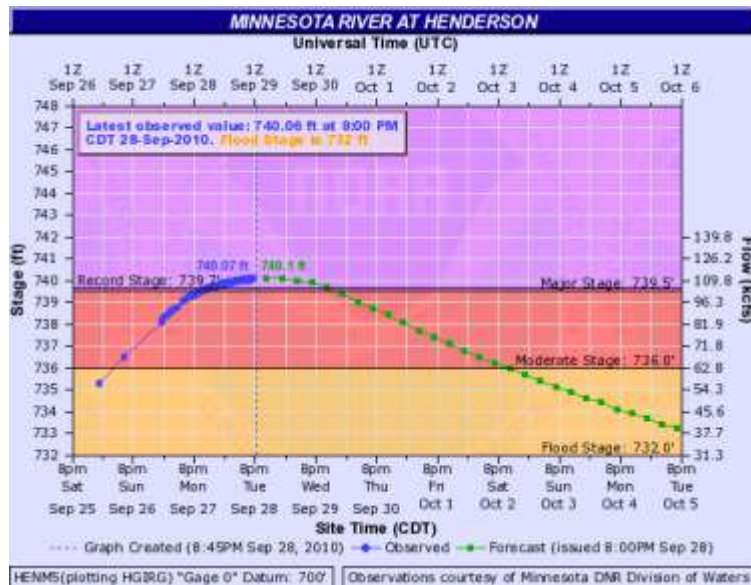
Chippewa River at Durand, WI - Sixth highest crest on record.



Cottonwood River at New Ulm, MN - Third highest crest on record.



Minnesota River at Mankato, MN - Fourth highest crest on record.



Minnesota River at Henderson, MN - Highest crest on record.